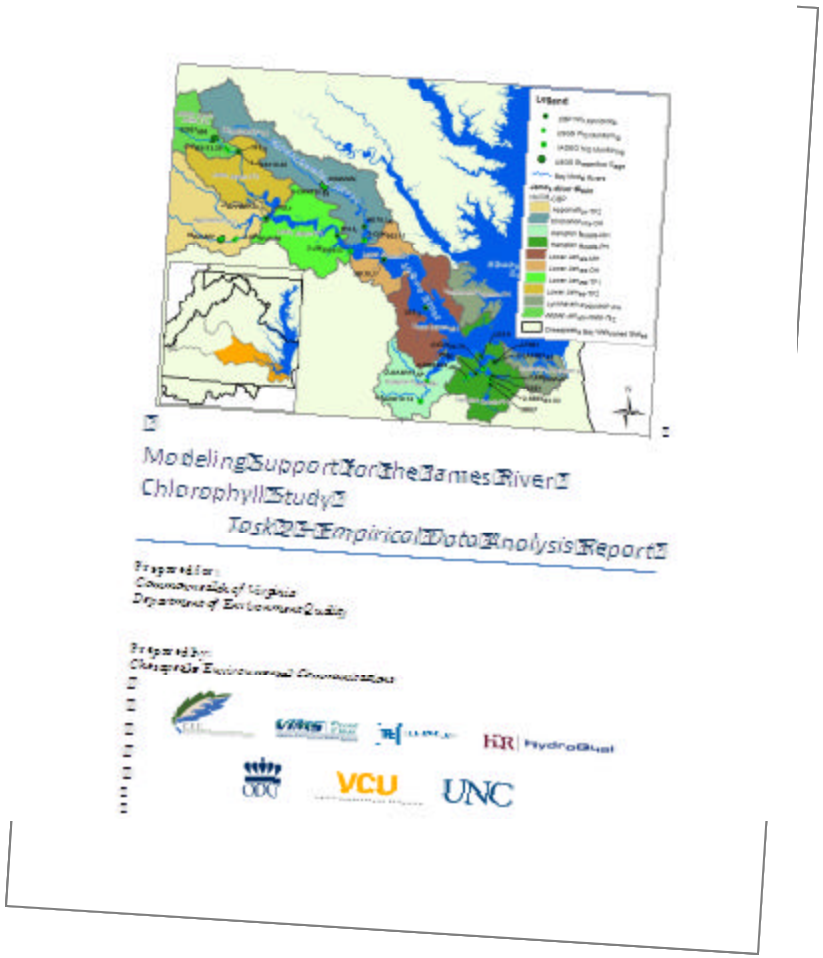
Modeling Support for James River Chlorophyll Study –
Task 2 Report

Presentation to the SAP 4/26/2013

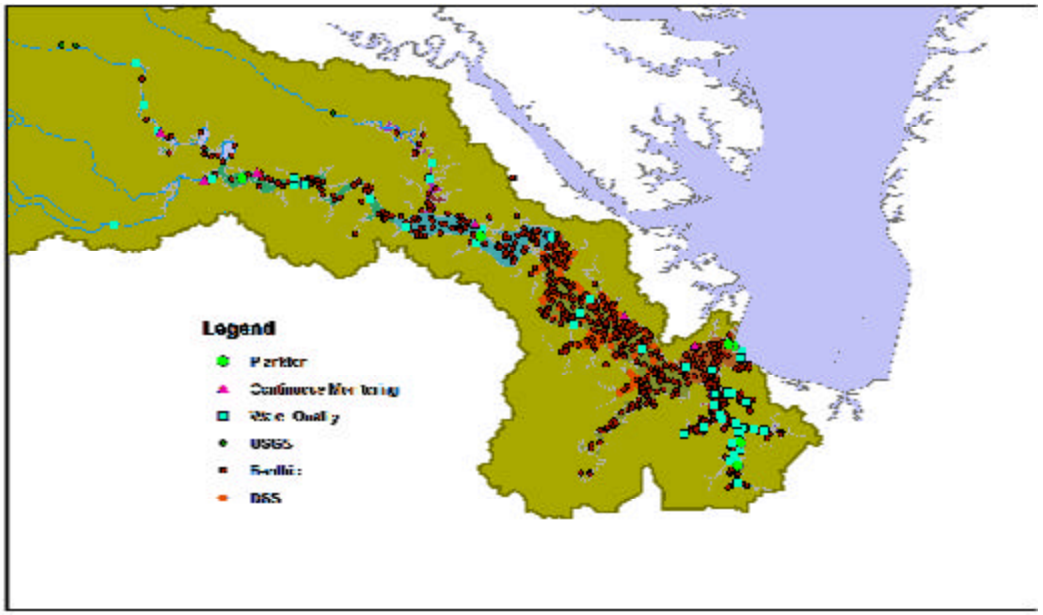
Dave Jasinski, CEC
Jim Fitzpatrick, HDR|HrydroQual
Andrew Parker, Tetra Tech
Harry Wang, VIMS
Jian Shen, VIMS

Task 2 – Report Submitted

- *Report submitted to DEQ April 18, 2012*
- *Will be posted to the modeling website (http://james.chesapeakedata.com/) when it is officially accepted by DEQ*



Task 2 – Overview



- *In **Task 1** we identified and obtained multiple data sets for the James River.*
- *In **Task 2** we began empirical data analysis to define:*

- Trends in fall-line loads, tidal water quality, and plankton dynamics.

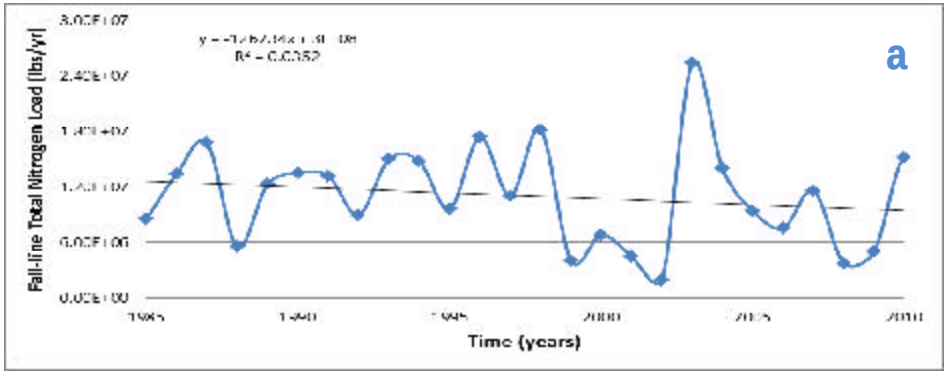
- Flow and nutrient budget by river segment

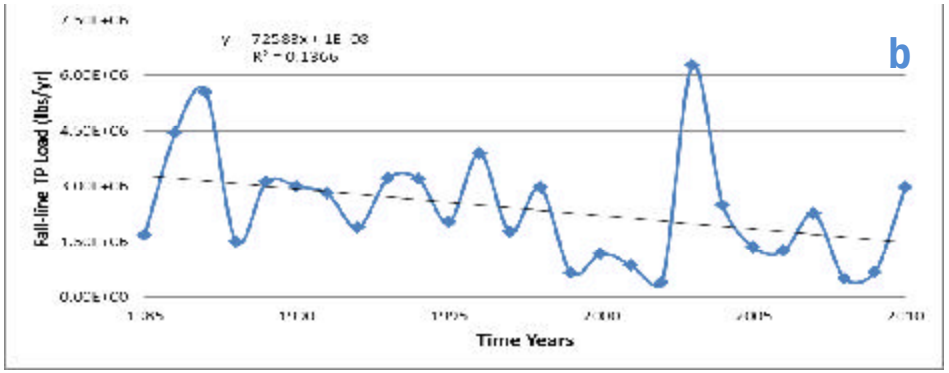
- Correlative and predictive relationships between plankton and physical and chemical water quality parameters

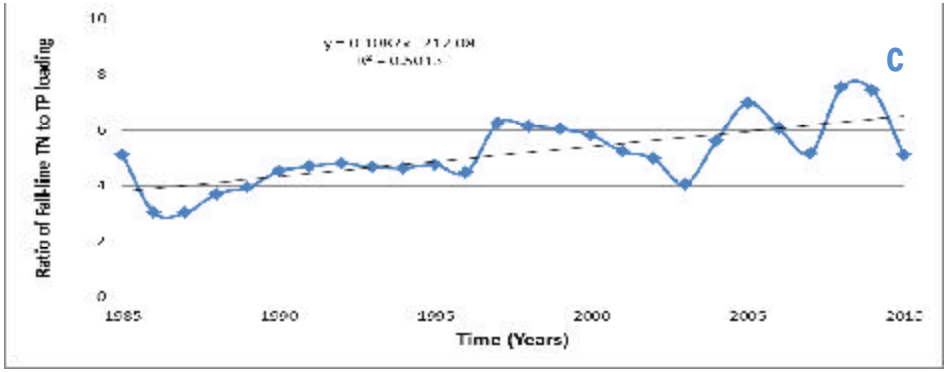
- Evaluation of Chlorophyll Critical Condition and Biological Reference Curve

Task 2 – Long term trends

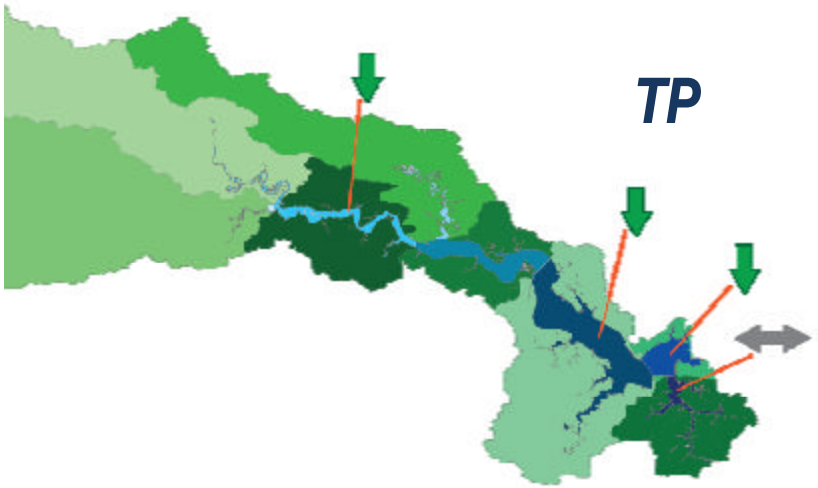
- *Fall line TN and TP loads at Cartersville have declined significantly.*
- *Steeper decline in TP has resulted in an increasing N:P of the load*

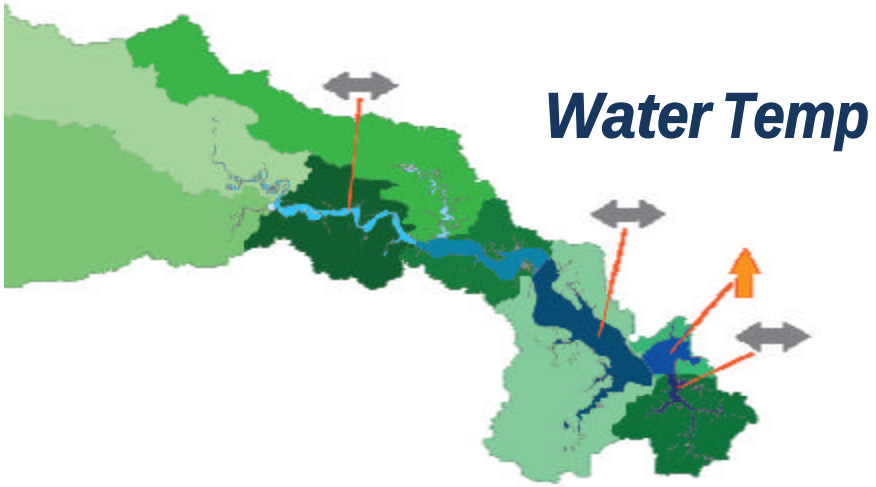




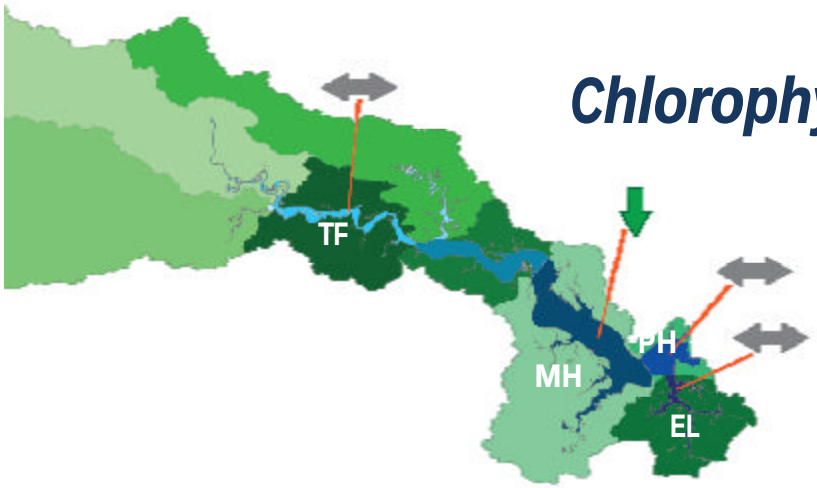


Task 2 – Long term trends - Tidal

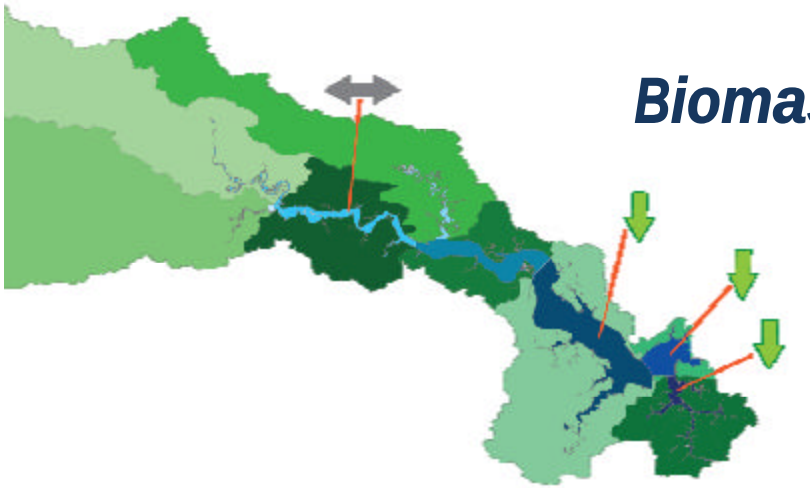




Task 2 – Long term trends - Tidal



Chlorophyll

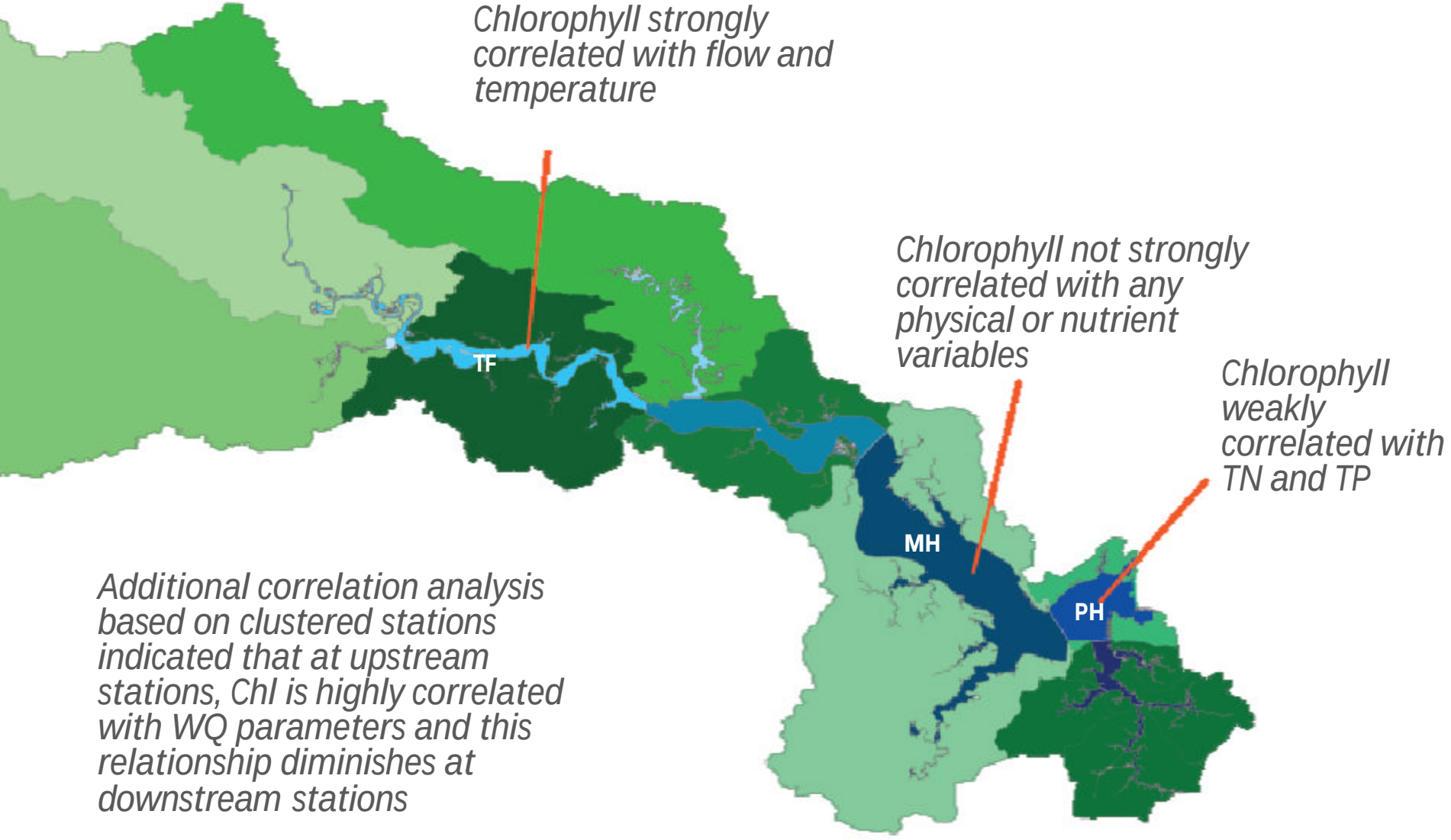


Biomass

Annual Abundance

Summer Abundance

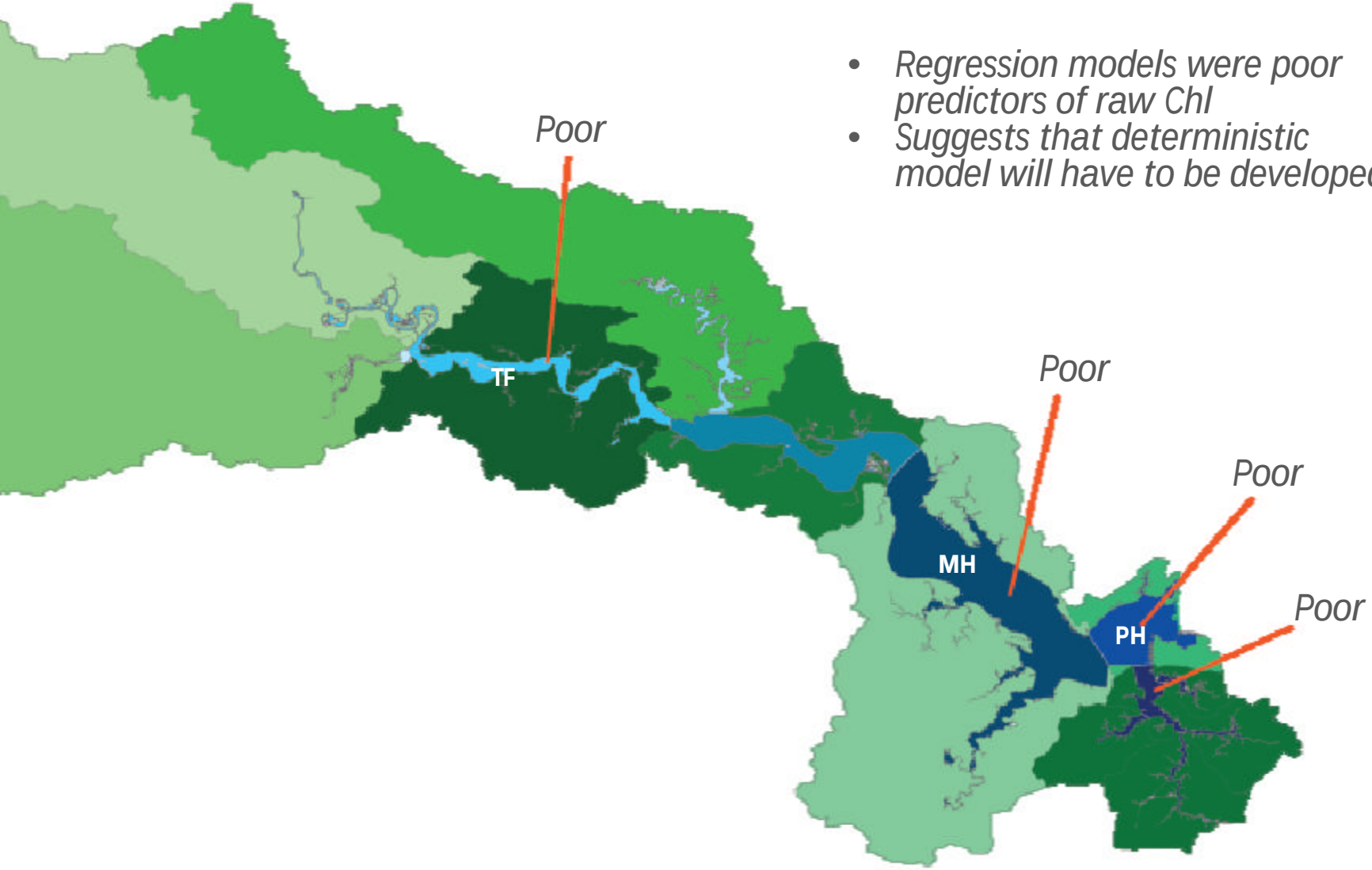
Task 2 – Correlation Analysis



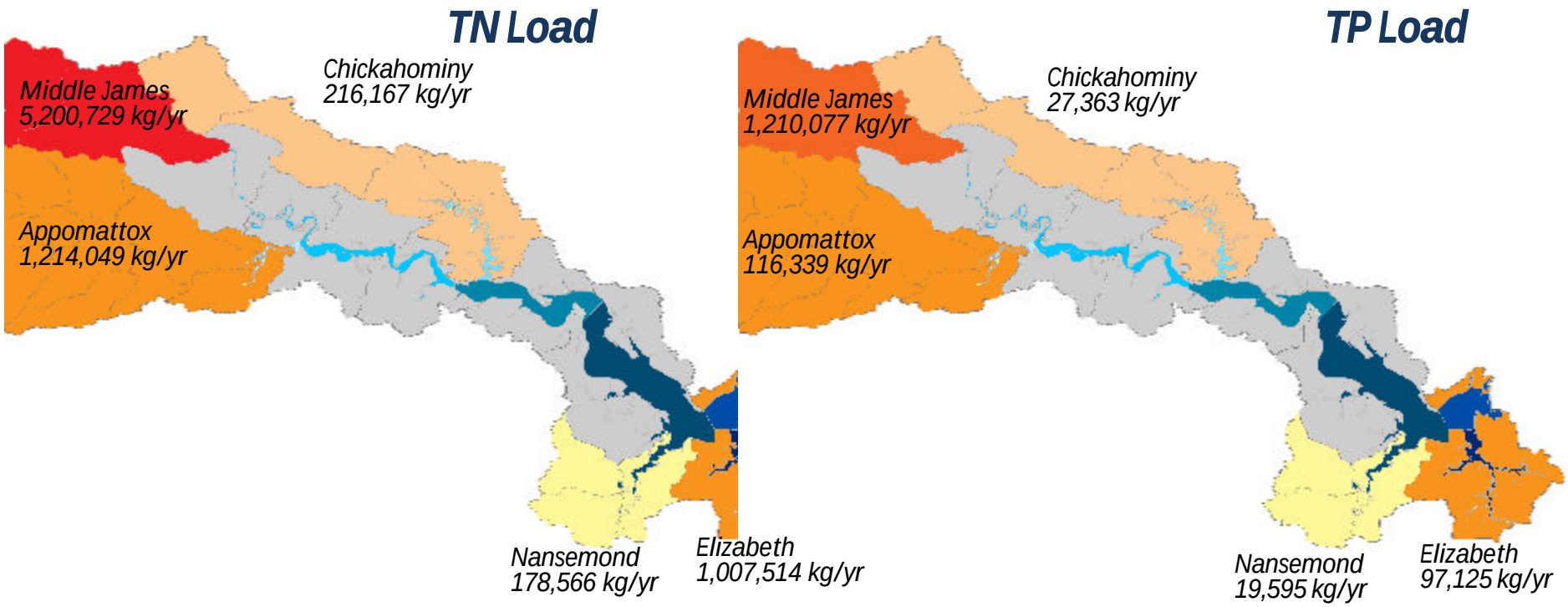
Additional correlation analysis based on clustered stations indicated that at upstream stations, Chl is highly correlated with WQ parameters and this relationship diminishes at downstream stations

Task 2 – Regression Analysis

- *Regression models were poor predictors of raw Chl*
- *Suggests that deterministic model will have to be developed*



Task 2 – Nutrient Budget



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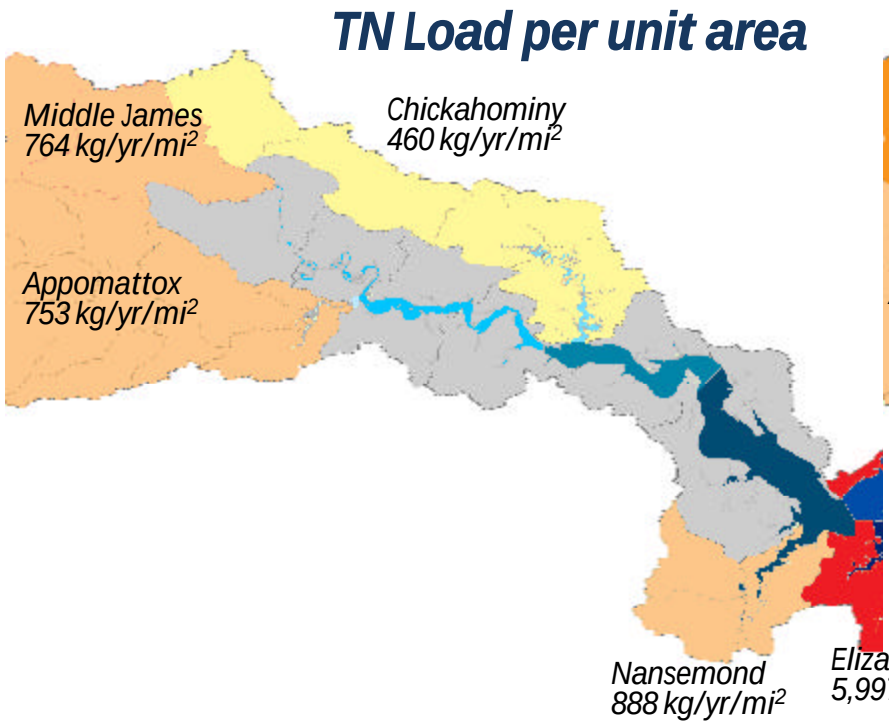

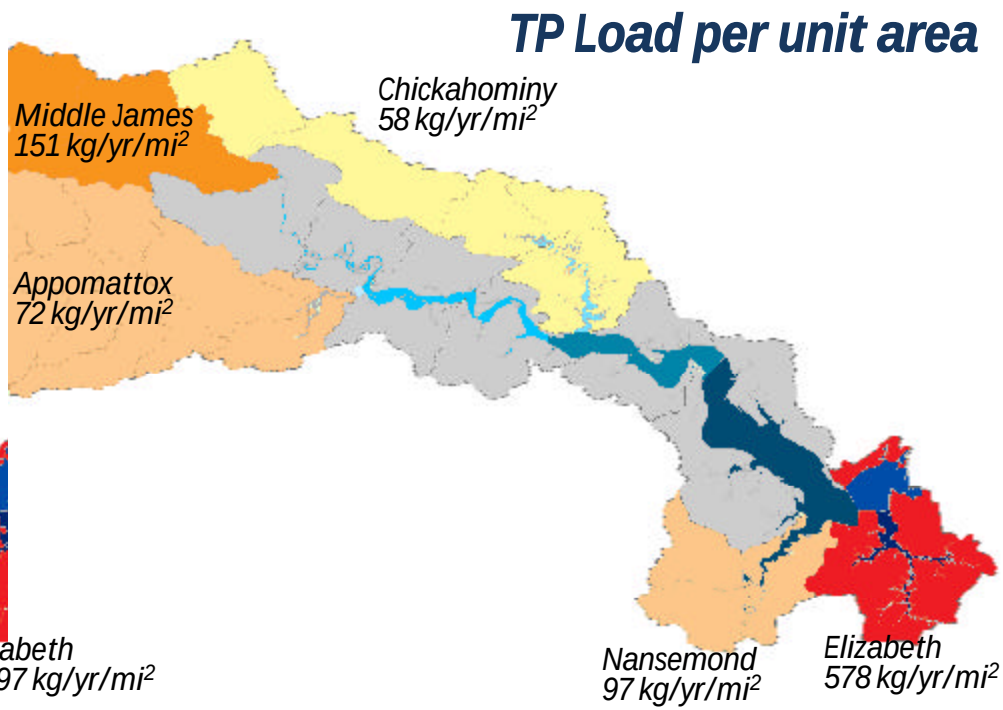

Task 2 – Critical Condition Analysis

- *Revisited the analysis done by EPA for Chesapeake TMDL development*
- *Results indicate that using flow (or any other single variable) for determining Critical Condition is not justified*

Task 2 – Biological Reference Curve

- *Analysis focused on the Tidal Fresh and on the dynamics of* Microcystis aeruginosa.
- *Best chance for developing a Biological Reference Curve for this region of the river is based on a correlation between* M. aeruginosa *and Chl-a, possibly in conjunction with TN*

Next Steps

- *Respond to DEQ comments on Task 2 report*
- *Focus efforts on model calibration and development*